

REMARKS

Reconsideration of the subject application is respectfully requested. Claims 1-18 remain pending.

In paragraph 2 of the Official Action, claims 1-12 are rejected under 35 U.S.C. §112, second paragraph. Applicants respectfully traverse the grounds for rejection. One of ordinary skill in the art would have understood the language of claim 1 to include fold roller passing at least one of (a) around and (b) along the rounded folding surface. However, for clarity, claim 1 has been amended to recite that the fold roller passes at least one of around a portion of the rounded folding surface and along a portion of the rounded folding surface. Thus, the rejection should be withdrawn.

In numbered paragraph 4, claims 1-17 are rejected under 35 U.S.C. §103(a) as being unpatentable over Applicants' WO 00/18583 (hereafter "*Trovinger*") in view of U.S. Patent No. 4,304,561 issued to Shingo (hereafter "*Shingo*"). For at least the reasons noted below, this rejection should be withdrawn.

The present invention is directed to folding sheet material. Figure 1a shows an exemplary embodiment of a sheet folding apparatus 100. The sheet folding apparatus 100 includes a fold blade 164 having a rounded folding surface 164b and a longitudinal axis along the x-axis of Fig. 1A. Apparatus 100 also includes at least one fold roller. Figs. 3A-3C illustrate exemplary embodiments with two fold rollers 306. A drive means 180 moves at least one of the fold blade and a fold roller into operable communication with one another such that the fold roller passes around and/or along the rounded folding surface. For example, and as shown in Figs. 3A-3C, the major axes of the fold rollers are parallel

to the major axis of the fold blade and define a plane through which the fold blade passes to place a rounded fold in the sheet material (See Figs. 3A-3C). Fig. 5 shows an exemplary embodiment with a fold roller 506 which rotates about an axis perpendicular to a longitudinal axis of fold blade 564. The folding surface 584 of fold roller 506 is shaped to conform to fold blade 564 to place a rounded fold in the sheet material.

The above-noted features are broadly encompassed by independent claims 1 and 13. Claim 1 recites that an apparatus for folding sheet material comprises a fold blade having a rounded folding surface, a fold roller, and drive means for moving at least one of the fold blade and the fold roller into operable communication such that the fold roller passes at least one of around a portion of the rounded folding surface and along a portion of the rounded folding surface. Claim 13 recites that a method for folding a sheet of material comprises the steps of feeding a sheet material into an area between a fold roller and a fold blade, and moving the fold roller and the fold relative to one another to form a rounded fold in the sheet using the fold blade, wherein the fold blade includes a rounded folding surface.

The rejection based on a hypothetical combination of the disclosures contained in *Trovinger* and *Shingo* is improper because the Official Action has not established that there would have been any suggestion or motivation for one skilled in the art to have modified the device described in *Trovinger* in the manner set forth in the Official Action. A detailed review of those portions of the disclosures in *Trovinger* and *Shingo* relied upon by the Examiner reveals no basis for the Examiner's proposed modifying of the device disclosed

in *Trovinger* in light of the disclosure in *Shingo* in the manner contemplated by the Official Action.

The *portion of the Trovinger* document relied upon by the Examiner discloses a method and apparatus for assembling sheets of printing media for booklets. *Trovinger* describes the fold mechanism beginning on page 21 and discloses that the fold mechanism 210 includes a fold blade 217. The fold blade is a thin, elongate, rigid, hardened stainless steel member that defines the shape and position of the fold in each sheet. See page 21, lines 23-25. The fold mechanism forms a sharp fold in each sheet by forcing the sheet down over a blade with a folder assembly 211 and pressing the fold into place over the blade with the folder assembly. See page 21 lines 2-4. To implement a folding operation, the folder assembly 211 moves transversely back and forth along the fold blade to crease the sheet along the length of the fold. See page 25, lines 20-23 and Figures 14, 15 and 20. The fold peak in the folded sheet assists in positioning the folded sheet on the inverted V-shaped saddle 259 and provides a datum that lines up the folds in the sheets for booklet making. See page 27 lines 22-30. Thus, *Trovinger* is concerned with providing a sharp fold in a folded sheet for subsequent positioning and registry of collected sheets in a booklet making operation.

The Examiner relies upon *Shingo* for its disclosure of a film folding device. *Shingo* continuously runs a film through a series of turns in which portions of the film are folded to a final form. Folding blade 17 has a "rounded edge 18" to address concentration of tensile force so that film is folded without producing a crease. See column 1, line 63 to column 2,

line 2. As the film is processed through the film folding device, the film 2 passes over folding blade 17 and produces a rounded fold.

One skilled in the art considering the relied upon disclosures contained in *Trovinger* and *Shingo* would not have modified the fold mechanism disclosed in *Trovinger* with the teachings of *Shingo* in the manner relied upon by the Examiner. The fold mechanism of *Trovinger* referenced by the Examiner contains a cooperating fold blade and fold rollers. However, the fold rollers contact the fold blade and translate along the length of the fold blade to place a sharp fold in the sheet material. This fold is later used as a datum for assembly of printed media into booklets.

In contrast, the film folding device in *Shingo* is quite different in that it relies upon tension in the film as it passes over a fold blade to avoid creasing the film. Considering that the fold mechanism of *Trovinger* is designed to form a sharp fold, there would have been no need to include the noted features from the film folding device disclosed in *Shingo* as they would have been unnecessary, and indeed contrary, to the intended operation of the fold mechanism described in *Trovinger*. Accordingly, there would have been no motivation or suggestion to have combined *Trovinger* and *Shingo* in the manner relied upon by the Examiner, and withdrawal of the rejection is respectfully requested.

In addition, the combination of *Trovinger* and *Shingo* is improper as a basis for the obviousness rejection because the proposed modification would have rendered one or the other cited references unsatisfactory for its intended purpose. For example, if the "rounded edge" fold blade of *Shingo* were to have been used in the fold mechanism 210 disclosed in *Trovinger*, then the resulting fold would not have been a sharp fold but rather a rounded

fold. Because a sharp fold is later utilized in this embodiment of *Trovinger* to collect the printing media for booklets and to serve as a datum that lines up the folds in the sheets, the proposed combination of *Trovinger* and *Shingo* is improper. The modification proposed by the Examiner would have changed the principle of operation of the *Trovinger* reference to the extent that it would no longer have been capable of performing its intended function, e.g., collecting printed media and serving as a datum to align the folds in the sheets.

The MPEP notes that a combination of references resulting in a prior art reference being unsatisfactory for its intended purpose is improper. See MPEP §2143.01. Here the combination proposed by the Examiner would have resulted in the fold mechanism of *Trovinger* not providing the sharp fold used for later collection and alignment. Since the proposed modification or combination of the prior art would have changed the principle of operation of the prior art being modified, the teachings of the references are insufficient to render the claims *prima facie* obviousness. See MPEP §2143.01. Accordingly, Applicants respectfully request the withdrawal of this rejection.

New claim 18 defines distinguishing characteristics associated with the claimed apparatus for folding sheet material. Claim 18 recites, *inter alia*, that each fold blade has a major axis in the first direction and a plane contains the major axis of the first fold roller and the major axis of the second fold roller. The drive means moves at least one of the fold blade and the plurality of fold rollers into operable communication such that the major axis of the fold blade passes through the plane. Both the fold mechanism 210 in *Trovinger* and the film folding device in *Shingo* are quite different in that *Trovinger* contacts the fold

blade and the fold roller and *Shingo* is silent as to the use of a fold roller with a fold blade.

Thus, new claim 18 is distinguishable over the cited documents for at least this reason.

From the foregoing, further and favorable action in the form of a Notice of Allowance is earnestly solicited. Should the Examiner feel that any issues remain, it is requested that the undersigned be contacted so that any such issues may be adequately addressed and prosecution of the instant application expedited.

Respectfully submitted,

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Attachment to Amendment dated April 21, 2003

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Pages 6-7, Paragraph [0014]

[0014] A drive means, such as drive means 180 in Figs. 1A and 1B, is provided for moving at least one of the fold blade and a fold roller into operable communication with one another such that the fold roller passes around and/or along the rounded folding surface. As referred hereon, "operable communication" means placement of the fold blade and/or the fold roller relative to one another to achieve a desired fold in a sheet material. In an exemplary embodiment, the drive means includes a coupling, such as coupling 116, and an actuator, such as lead screw 110, attached to the coupling, wherein rotation of the lead screw in a first direction is operable to move the at least one fold roller against the fold blade to create a rounded fold in a sheet material. In the examples shown in Figs. 1A and 1B, drive means 180 includes coupling 116, lead screw 110, a motor 114, and a drive belt 132. Motor 114 can be of any conventional type (such as electric, pneumatic, or hydraulic), or can be of any other type. The exemplary lead screw 110 can be rotated by motor 114 via drive belt 132 or alternatively via any other power transmitting element, such as a chain, or can be replaced by another type of actuator, such as a piston.

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Attachment to Amendment dated April 21, 2003

Marked-up Claim 1

1. (Amended) An apparatus for folding sheet material, comprising:
 - a fold blade having a rounded folding surface;
 - a fold roller; and
 - drive means for moving at least one of the fold blade and the fold roller into operable communication such that the fold roller passes at least one of around a portion of the rounded folding surface and along a portion of the rounded folding surface.